**Optical Diagnostic Suite (Schlieren, Interferometry, and Angular Filter Refractometry) on OMEGA EP Using a 10-ps, 263-nm Probe Beam**


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**Project Overview**

A 4-kW probe laser and optical diagnostic suite is available on OMEGA EP.

- **Timing Diagnostic:**
  - A 10-ps, 26-mJ, 4-kW probe laser is implemented on OMEGA EP.
  - The system will initially be configured for:
    - coherent optical interferometry
    - angular filter refractometry (AFR)
  - The design presents options for expanded optical diagnostics.
  - Advanced optical diagnostics are being adapted to provide synthetic diagnostic images for experimental testing and analysis.

The three diagnostics coupled with detailed optical modeling will provide a novel diagnostic platform.

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**Scope of Diagnostics**

The F4 collection system will provide <5 μm resolution over the 5-mm field of view (FOV).

- **Optical Diagnostic Suite**
  - Optical diagnostics will provide access to high-density laser-produced plasmas.
  - The three diagnostics coupled with detailed optical modeling will provide high-density laser-produced plasmas.

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**Angular Filter Refractometry**

Angular filter refractometry maps the refraction of the probe beam at target chamber center to contours in the plasma image plane.

- The temporal evolution of the plasma density profile of UV-irradiated planar targets is illustrated using the angular filter refractometer.

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**Experimental Design Considerations**

- **Interferometry** is limited to electron densities below $4 \times 10^{20}$ cm$^{-3}$ in laser-produced plasmas.
- **Optical modeling** can be used to optimize experimental design and identify limitations.

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**Optical Modeling**

Optical modeling provides the density measurements to $10^{21}$ cm$^{-3}$ in long-scale-length plasmas.